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# Post-Mortem: Eight Years of Comprehensive Design Experiments and What Comes Next

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This paper documents the eight-year evolution of the Department of Architecture's Comprehensive Design program at Iowa State University. Since its initial offering in 2001, we have attempted to deliver the NAAB requirement in a broad, holistic context, incorporating not only the required technical aspects of studio work, but also an urban, civic agenda and an emphasis on human, public space. The result has been a studio that is seen by the department and by partners in the profession as a model for integrative, collaborative work, and we offer techniques and suggestions for other programs with evolving Comprehensive studios.

At the same time, we were not fully satisfied with the Studio in its existing form, and did receive criticism during our most recent NAAB visit (in 2006) that has again led us to re-cast the Comprehensive Design studio, this time in two parts to address the range of topics required. We report on this development, on our current plans, and on the initial offering of this revised, two-part studio (Fall, 2008).

## DEFINITIONS

*"28. Comprehensive Design: Ability to produce a comprehensive architectural project based on a building program and site that includes development of programmed spaces demonstrating an understanding of structural and environmental systems, building envelope systems, life-safety*

*provisions, wall sections and building assemblies and the principles of sustainability."*

## HISTORY

After a NAAB visit in 2001 that noted the lack of a dedicated Comprehensive Design studio in our five-year, B.Arch. program, we scrambled to come up with a response that would meet this requirement while adding to, rather than detracting from, our program's emphasis on integrated, holistic studios that addressed technology as one of many necessary aspects of architectural production. We researched other programs' responses to this relatively new requirement, and noted three distinct approaches:

- A "capstone" studio in the final year of the professional degree program, done as a summative exercise in studio and technology classes;
- A thesis or independent study project that included requirements for the technical aspects listed by NAAB as Comprehensive Design elements;
- A project done within a Technologies sequence that focused less on design and more on specific technical aspects.

While these each had adherents, and some track records of success, they did not precisely fit our

program's aspirations. We had a fifth year with dedicated independent work that was seen as productively theoretical; a capstone would have replaced a semester of exploration that we felt was valuable for our students and adding Comprehensive Design requirements to what was then our diploma project would have limited the exploratory work that had been a hallmark of this semester. We were, finally, not enthusiastic about 'redlining' Comprehensive Design in a technologies class; rather, we thought there should be an opportunity to see how these aspects could be integrated with the challenging range of elements of cultural, civic, and scalar complexity that we consistently pursue in our upper division studios.

Instead, we looked at our fourth year studios as a potential 'home' for Comprehensive Design. Traditionally we had treated fourth year as a sort of intermediate between smaller projects and larger or more conceptual ones, with a dedicated urban project that built on work done by Marcy Schulte on Franco-American traditions in American cities - New Orleans - in one semester, and a study abroad opportunity in Rome during the other. The urban focus of these early studios in New Orleans, and later Montreal, seemed to us a likely starting point to develop a broad, comprehensive studio since it provided a context in which developments in structure, environment, and materials and methods could be immersed. The resulting relationships might offer a perspective that would help our students to see how technology existed within the 'big picture' of cities and public space; it would likewise show how urban or large-scale architectural context made sense only as their realization was considered. While we were concerned about losing the focus of our one major urban design studio, we recognized that the result could set up the Rome program as a far better informed experience.

Our initial efforts to introduce Comprehensive Design into the 4<sup>th</sup> year made use of a program from the previous year for a Digital Media Research laboratory in Montreal, incorporating laboratory and classroom space, housing for faculty, and various forms of public display: a gallery, a theatre, and a 'black box' audio/video projection space. The program, modeled roughly after the MIT Media Lab, sought to challenge students to address the possible impacts of emerging technologies on the experience of architecture and the city. Our site also

recycled a previous location, on Montreal's Plateau, a neighborhood rich in interaction, languages, and cultures, and home to a growing IT sector. We changed the focus of the requirements, asking for far more detailed sections and investigation into materials, environmental response, and structure, but recognized that this was a partial step at best.

The second offering, in Spring, 2002, represented our first step toward a dedicated Comprehensive Design program. After considering long span and high-rise problems, we settled on a program for a branch library with a dedicated cultural theme. We selected a site in Los Angeles, in part to avoid a field trip to Montreal in January, but also to see what opportunities were offered by a less dense setting. We also introduced an optional, 'scaffold' course, the Integrated Design Workshop, that offered refresher lectures on technical topics required by the NAAB language. The Workshop also asked students to prepare a series of 'client brochures' that would explore each of these topics and their application in the students' projects in greater detail than studio required (the topics we selected were Program Analysis, Site Analysis, Circulation, Structural Design, Environmental Response, and Cladding). Scheduling this class in conjunction with four studios proved difficult, but we quickly saw the benefits of such a 'spiraling' class, one that repeated topics covered in prior technologies courses, but presented them within the advanced design context that students had matriculated into. Los Angeles proved to be a difficult site; the inevitable requirements for substantial parking led to too great an emphasis on automotive circulation, and while some students experimented successfully with the structural resonance between book stacks and car parking, this proved to be a distraction in most cases. We returned to Montreal in the fall of 2002, 2003 and 2004, with refinements to the Digital Media Laboratory that simplified its multitude of requirements considerably. We eliminated the residential component entirely, and added detailed requirements for daylighting, office sizes, and underground car parking, the latter to force students to establish a regular structural grid. We continued our optional Workshop class, with a flexible schedule to accommodate individual studios' review calendars.

After the Fall 2004 studio, we assessed the studio's success as a fully "comprehensive" studio



Figure 1. Digital Media Laboratory, Montreal, QC. Zachary Helmers and Joe Friedman, Fall, 2002

and asked ourselves whether we had achieved the broad integration we'd hoped for. Were our students able to demonstrate the required knowledge in structure, program analysis, environmental response, life safety, and cladding? Were these holistically conceived, or were they simply tacked on? And, most importantly for us, were they able to draw the broad connections between the 'nuts and bolts' that we were required to emphasize, and the broader urban and civic values that we had brought from the old studio? Had the Workshop course been effective in promoting these areas? Or had it detracted from larger civic or architectural concerns?

We presented the results of our efforts at several ACSA conferences in 2003 and 2004 as we were considering these issues, and decided that the results were, frankly, mixed. We were certainly seeing work that was more technically proficient than previous fourth year studios, and that made tentative links between these and architectural and urban expression. The complexity of the program left some students behind, and took time away from the development of designs into systems and materials that we knew were critical to meeting the intent of the NAAB criteria. The optional workshop class produced some work that took these issues to a more studied level, and we were generally pleased with the projects' response to their dense urban site. But we agreed that these were, at best, linear improvements; we had not seen successful projects across the board, and students seemed to

struggle with the twin poles of technical proficiency and civic relevance. Likewise, work in the Workshop was inconsistent. It was clear that roughly 1/3 of the students in the class recognized the links between these six areas and their possible architectural expression; but about an equal number of students saw the course only as extra work, and did not clearly understand the potential for this in-depth exploration to enrich their design efforts.

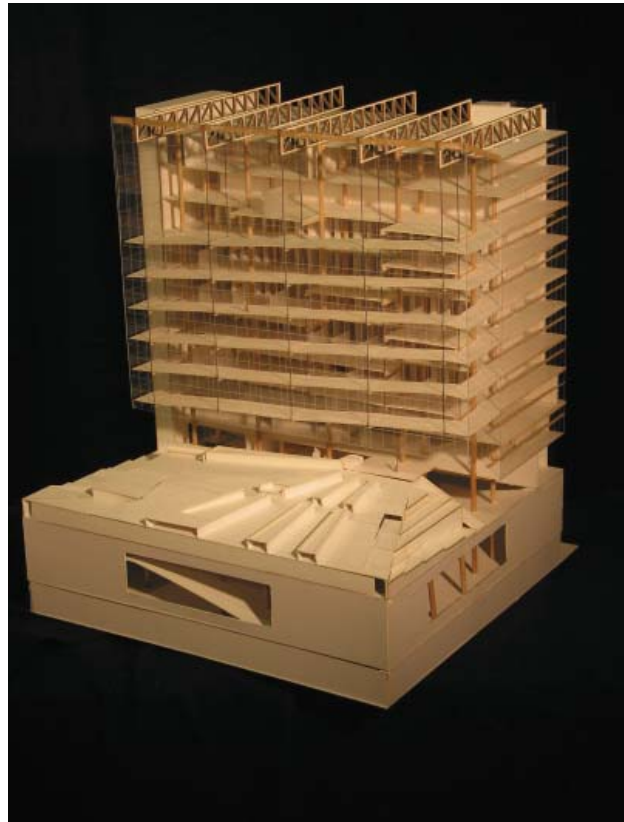


Figure 2. Mediatheque, Montreal, QC. Kristin Jensen and Tonia Sorenson, Fall, 2004.

Beginning in 2005, we made three major changes that reflected these concerns. First, learning some lessons from our Los Angeles experiment, we changed the program from a Digital Media Research Laboratory to a "Mediatheque," or multi-media library. Using projects by Toyo Ito and Norman Foster as our precedents, we crafted a program that included diverse activities—book stacks, digital media storage and display, cinema, and gallery space—that formed more coherent programmatic and spatial links to one another. The selection of

a dedicated civic program emphasized the urban aspect of the studio, and we included significant requirements for indoor and outdoor space. Finally, the provision for large floor areas of stacks (for both books and digital storage) added a considerable portion of repetitive space and structure; students were less tempted to see the program as a collage of different elements and more as a chassis of regular stack space with ancillary activities that had to be related to this main spine. OMA's Seattle Public Library was offered as a model of how such a primary storage and circulatory element could inform a far larger complex.

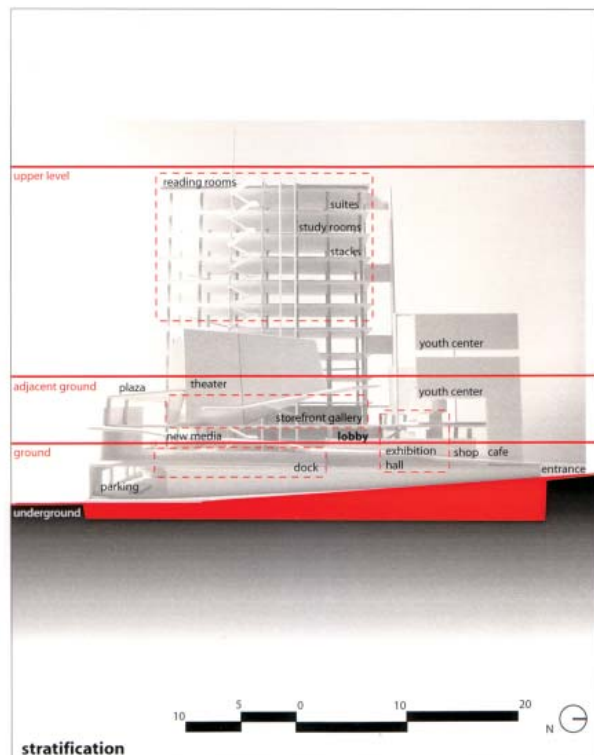


Figure 3. Example of work done in ARCH 528, Integrated Design Workshop. Anna Aversing and Chris Behrens, Fall, 2004.

Our second change was to manipulate the semester schedule to compress the schematic design phase and to allow more time in the development phase; simply moving the mid-review a week or two earlier meant a more frantic initial portion of the term, but it gave students more time to refine and detail their designs. In conjunction with this, some instructors required far larger section models



Figure 4. Mediatheque, Montreal, QC. Alissa MacInnes and Younsgu Kim, Fall, 2004.

(1:50) for the final review that clearly emphasized the integration of structure, material, and space.

Thirdly, acknowledging the extra time and effort involved in such production, we also emphasized collaboration more explicitly, encouraging students to work in pairs throughout the semester. Students responded to this with surprising enthusiasm; while some issues with shared workload and communication were inevitable, the results were clearly more productive across the board. Collaborative design became a central component of the studio.

The "Mediatheque" project was largely successful in addressing the problems we had identified. The program offered more apparent relationships that were seized upon by students to produce clear, organized schemes. They responded to the implied hierarchies of shelving, public space, services, and administrative offices with diagrammatic plans that addressed the needs of these elements along multiple dimensions, and they likewise recognized the organizing potential of structure and circulation; the more cohesive program made such an integrative approach more apparent in the early stages of the project. Similarly, the library program was understood as a profoundly important public addition to Montreal; this development benefited from our relocation of the site to one on the boundary between the historic "Old Montreal," a developing financial district around the Congress Center, and the modern central business district. Students recognized the circulatory and social links that converged on



the site, and responded with buildings that, as we had hoped, addressed the public realm more consistently and more generously than had been possible with a more institutional program. Likewise, the renewed emphasis on resolution and detail in the latter part of the semester clearly produced results, though we were somewhat disappointed to see that this was inconsistent; some teams were able to carry their projects through to a very articulate level, while others—whether through lack of knowledge or lack of time—were unable to successfully develop drawings and models that showed a coherent detailing strategy. The Workshop course remained an important contribution, and again offered significant support for these development efforts, but we remained somewhat frustrated that the level of resolution in these varied widely, as did the level of participation in the class.

Inconsistent participation in the workshop finally convinced us to try integrating much of its content directly into the Comprehensive Design studio in a one-semester experiment in the Fall of 2005. Lectures were offered to the entire studio on a biweekly basis, addressing the topics of Program Analysis, Site Analysis, Circulation, Structural Design, Environmental Response, and Cladding, as in the workshop. Studio instructors were encouraged to add some of the additional drawing and documentation requirements of the client brochures used in the workshop to their studio requirements. The results were deemed a failure, as the students were unable to fully digest and integrate these additional requirements into their studio projects without any additional time allotment. All sections participated in the lectures, but most merely ignored the encouragement to add requirements to their projects. The experiment was not repeated in subsequent years.

In 2007 we were forced to move the project's location again, this time due to the U.S. Dollar's fall against Canadian currency. Faced with the need to provide students with an affordable field trip, we selected Boston as a viable alternative to Montreal, one that offered a similarly dense urban fabric with patterns and spaces that were radically different from typical Midwestern cities. With the help of recent alumni now based in the city, we were able to find an open site on Washington Street between Downtown Crossing and the Theater District, which we combined with an updated version of the Medi-

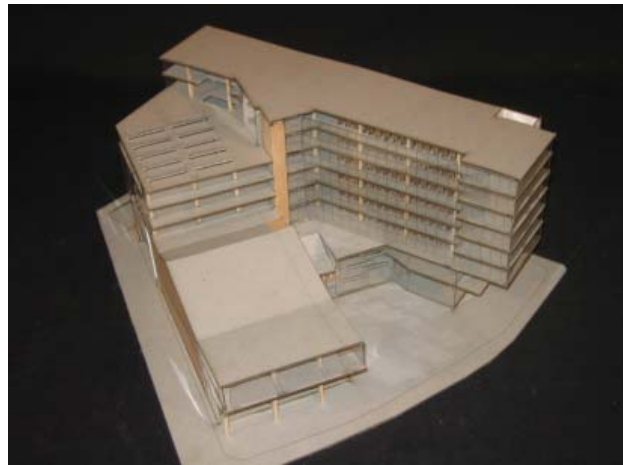


Figure 5. Mediatheque, Boston, MA. Emily Wulf and Dustin Hanford, Fall, 2007.

atheque program. The site, an irregular block (like most in Boston) proved ideal, with a mix of building scales and functions, proximity to both Boston Common and highly trafficked areas of the central city, and good precedents in the existing Boston Public Library and the newly completed Institute for Contemporary Art by Diller, Scofidio, and Renfro. We standardized the review schedule for all four sections, enabling us to provide a firm calendar for the Workshop class, and changed the requirements for large scale models, giving students the option to produce either a 1:50 section model or a 1:100 overall model; with the accuracy of our department's laser cutter, we were confident that cladding and even some detailing issues could be considered and resolved at either scale.

## OBSERVATIONS

The 2007 project was, to our minds, the most successful offering of the Comprehensive Design studio; an extended tour of the Boston Public Library's central facility undoubtedly helped, but we also think that the combination of program, requirements, and collaboration finally hit the right balance after several years of experimentation. Projects in all studios were more consistently executed, and while the best projects of the term still separated themselves, the lower 1/3 of each section was demonstrably more thoroughly finished and resolved than in previous years. We believe there are several important lessons to be drawn from this experience:

- Programs for Comprehensive Design must be carefully tuned to provide challenging structural, circulatory, and spatial relationships, but there must be underlying consistency that students can 'latch on' to in order to find integrative possibilities. The library program offered related program areas and a natural organizing element that challenged teams, but that also suggested productive paths for exploration.
- It is genuinely possible to address the extensive requirements for Comprehensive Design while simultaneously addressing the values and subjects of traditional urban scale studios; this has proven to be the project's most productive aspect, in our opinion. In particular, selecting sites that are poised between neighborhoods or activities has suggested the continuation of the public realm indoors, consistently, in our students' work.
- The use of a diverse range of design media, including CAD, collage, digital imaging, rough study models, finely detailed models, digital modeling, etc., and the dialogue between different modes of representation, has served to enrich the Comprehensive Design projects of our students, supporting an expansive design process.
- The advent of the laser cutter, in particular, has had a dramatic impact on the studio, making physical modeling of very complex building sections and forms eminently possible at both design development and final design stages; this suggests requirements tuned to the three-dimensional exploration made possible by such equipment. The scale of models, however, needs to be carefully considered, as they are time-consuming even with four hands and the best of technology. Where 1:50 models were necessary three or four years ago, 1:100 overall models now work well, in conjunction with detail models or drawings, in enabling students to grapple with the necessary level of detail in their projects.
- Students can and will size structural and mechanical elements in their designs if given tools to do this quickly and efficiently. The use of charts such as those in Edward Allen's *Studio Companion* provide a valuable tool for this if emphasized by instructors

and accepted for rough sizing. Students reported that this process "made their buildings seem more real," and we agree.

- Finally, the occasional inconveniences and friction of group work has been well worth the gains made by pairs of students. In addition to the extra available labor, design discussions between students inevitably lead to ideas that are more deeply considered and argued even prior to the desk crit.

## GOING FORWARD

So, did we finally pass the NAAB Comprehensive Design Condition? No, and there's a very practical lesson in our failure to do so during our 2007 visit. While acknowledging the high quality of the student work, our accreditation team pointed out that significant portions of the studio's success were due to the Integrated Design Workshop course, which was only offered as a parallel elective. Even though 1/2 to 2/3 of the studio enrollees took the course, and even though many who were not in the course attended lectures, and benefited from contact with classmates who did, the team correctly pointed out that none of the NAAB Conditions may be met by elective coursework. Having included the Workshop in the "Electives" portion of our display, the team pointed this out as evidence that many students were not getting the benefit of this class.

Our initial reaction was that this was a technicality, as we believed that the Studio itself fulfilled the criteria and intent of Condition 28. However, on reflection, we noted the shortcomings of the Workshop class as a "required" elective. Ultimately we accepted that given our inability to add another required technology course to our undergraduate curriculum, and recognizing the failure of our one-semester experiment to integrate the Workshop content directly into the studio curriculum, that we had to consider other options.

In addition to the Comprehensive Design issue, we had also been criticized in the accreditation report for not fulfilling Condition 16, Program Preparation. Our Undergraduate Program Committee asked us to consider whether the Comprehensive Design studio might be able to address this requirement as well. These discussions took place in the context of a broader discussion about our undergraduate

curriculum, focusing on the final two years. The suggestion was made that in a five-year B.Arch. program, independent studio work might be reduced or eliminated in favor of more directed studios, in contrast to our existing structure. The Undergraduate Committee came to the decision that Comprehensive Design could be productively split into two semesters: Fall of fourth year, which would emphasize Programming, passive environmental response, and low-rise structures while still addressing urban issues, perhaps in an area of lesser density, and Fall of fifth year, which could build on the success of the Mediatheque project while reducing some of the time pressure that an intensive program analysis inevitably added. The lectures that had been offered in the Workshop could, with a greater spread, be offered over these two semesters, and students could be required to produce similar information over these two courses as well, further reducing the time burden on them and allowing greater concentration on areas that we felt necessary to address more fully.

This constitutes a major change in our undergraduate curriculum, eliminating a semester of possible independent work in the fifth year and replacing it with another required studio, but it nonetheless addresses one of the major limitations of our previous efforts to teach comprehensive design: our inability to offer the same curriculum to all of our students. The Undergraduate Committee acknowledged the strengths of the existing Comprehensive Design studio – the combination of a moderately large scale civic program with a historically layered, urban site, and a pedagogy emphasizing collaborative design – but felt that this would be better served in Fifth Year, with another year of preparation on the part of our students.

The fourth year Comprehensive Design studio, on the other hand, has had to be entirely recast for the current academic year. Our first step was to change the site location and urban context, from the historic, layered cities of the east coast to the modern cities of the west coast. After considering various options, we decided on Seattle, a rapidly growing and transforming city, with a strong Green Building culture, and a wealth of alumni from our program. As in our previous efforts, we have endeavored to offer a program that draws upon local cultural practices and resources. The program was thus cast as center for glass artists, under the

institutional framework of a fictional organization, Glass Arts Seattle. In contrast to previous years, students this year were offered a simple 'client letter' requesting programming services for a Fellows Center to accommodate six teaching and working in-residence glass artists, with studio and teaching accommodations, residential space, exhibition space, and administrative space. Students were asked to work in teams of four to prepare a thorough program report to be presented to the faculty and the Fourth Year class, with the best reports to be selected for use by the whole class in the subsequent design phase. Presentations were recently made, with encouraging results.

## CONCLUSIONS

It is still too early to judge the outcome of our most recent efforts in redefining the Comprehensive Design curriculum. The jury is still out, literally, in the studios. Nonetheless we are optimistic about the potential benefits of our two-course strategy, and the opportunity to more fully address the range of topics required in a Comprehensive Design curriculum over two semesters and a range of scales – not because we are unequivocal believers of the merits of Performance Criteria #28, but because we remain committed in our program to the teaching of design as an integrated, holistic process that addresses technology as one of many necessary aspects of architectural production over the full five years of our undergraduate program.